

CLAIMS

What is claimed is:

1. A method for implementing smart DSL for LDSL systems, the method comprising:
defining a candidate system to be implemented by an LDSL system;
optimizing criteria associated with the candidate system; and
selecting a candidate system to implement in an LDSL system.
2. The method of claim 1 wherein defining a candidate system further comprises:
determining features of upstream transmission.
3. The method of claim 2 wherein determining features of upstream transmission further comprises:
determining one or more of: cut-off frequencies, side lobe shapes, overlap, partial overlap or FDD characteristics.
4. The method of claim 1 wherein defining a candidate system further comprises:
determining features of downstream transmission.
5. The method of claim 4 wherein determining features of downstream transmission further comprises:
determining one or more of: cut-off frequencies, side lobe shapes, overlap, partial overlap or FDD characteristics.
6. The method of claim 1 wherein optimizing criteria associated with the candidate system further comprises:

optimizing criteria associated with the candidate system to fulfill upstream and downstream performance targets.

7. The method of claim 1 wherein selecting a candidate system to implement in an LDSL system further comprises:
selecting a spectral mask for use with upstream or downstream transmission.
8. The method of claim 1 wherein selecting a candidate system to implement in an LDSL system further comprises:
selecting a candidate system during modem handshake procedures.
9. The method of claim 1 wherein defining a candidate system to be implemented in an LDSL system further comprises defining a number of masks.
10. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and D is the value of the mask in dBm/Hz:
for $0 < f \leq 4$, then $D = -97.5$, with max power in the in 0-4 kHz band of +15 dBm;
for $4 < f \leq 5$, then $D = -92.5 + 18.64 \log_2(f/4)$;
for $5 < f \leq 5.25$, then $D = -86.5$;
for $5.25 < f \leq 16$, then $D = -86.5 + 15.25 \log_2(f/5.25)$;
for $16 < f \leq 32$, then $D = -62 + 25.5 \log_2(f/16)$;
for $32 < f \leq 138$, then $D = -36.5$;
for $138 < f \leq 323.4375$, then $D = -31.8$;
for $323.4375 < f \leq 517.5$, then $D = -31.8 - 0.0371 \times (f - 323.4375)$;
for $258.75 < f \leq 1800$, then $D = \max(-39 - 23.27 \times \log_2(f/517.5), -65)$;
for $1800 < f \leq 2290$, then $D = -65 - 72 \times \log_2(f/1800)$;
for $2290 < f \leq 3093$, then $D = -90$;

for $3093 < f \leq 4545$, then $D = -90$ peak, with max power in the $[f, f + 1 \text{ MHz}]$ window of $(-36.5 - 36 \times \log_2(f/1104) + 60) \text{ dBm}$; and
 for $4545 < f \leq 11\,040$, then $D = -90$ peak, with max power in the $[f, f + 1 \text{ MHz}]$ window of -50 dBm .

11. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and M is the value of the mask in dBm/Hz:

for $0 < f < 4$, then $M = -97.5$;
 for $4 < f < 80$, then $M = -92.5 + 4.63 \cdot \log_2(f/4)$;
 for $80 < f < 138$, then $M = -72.5 + 36 \cdot \log_2(f/80)$;
 for $138 < f < 1104$, then $M = -37.9$;
 for $1104 < f < 1622$, then $M = -37.9 - 15.5 \cdot \log_2(f/1104)$;
 for $1622 < f < 3750$, then $M = -46.5 - 2.9 \cdot \log_2(f/1622)$;
 for $f = 3750$, then $M = -76.5$;
 for $f = 3925$, then $M = -101.5$; and
 for $f > 3925$, then $M = -101.5$.

12. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and D is the value of the mask in dBm/Hz:

for $0 < f < 4$, then $D = -97.5$;
 for $4 < f < 25.875$, then $D = -92.5 + 21 \cdot \log_2(f/4)$;
 for $25.875 < f < 1104$, then $D = -38.3$;
 for $1104 < f < 1622$, then $D = -38.3 - 14.75 \cdot \log_2(f/1104)$;
 for $1622 < f < 3750$; then $D = -46.5 - 2.9 \cdot \log_2(f/1622)$;
 for $f = 3750$, then $D = -76.5$; and
 for $f > 3925$, then $D = -101.5$.

13. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and U is the value of the mask in dBm/Hz:
- for $0 < f < 4$, then $U = -97.5$;
 - for $4 < f < 25.875$, then $U = -92.5 + 21.5 \cdot \log_2(f/4)$;
 - for $25.875 < f < 138$, then $U = -34.5$;
 - for $138 < f < 276$, then $U = -34.5 - 26 \cdot \log_2(f/138)$;
 - for $276 < f < f_{int}$, then $U = -60.5 - 95 \cdot \log_2(f/276)$; and
 - for $f_{int} < f < 686$, then $U = 10 \log_{10}(0.05683 \cdot f^{1.5})$.
14. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and M is the value of the mask in dBm/Hz:
- for $0 < f < 4$, then $M = -97.5$;
 - for $4 < f < 80$, then $M = -92.5 + 4.63 \cdot \log_2(f/4)$;
 - for $80 < f < 138$, then $M = -72.5 + 36 \cdot \log_2(f/80)$;
 - for $138 < f < 1104$, then $M = -37.9$;
 - for $1104 < f < 1622$, then $M = -37.9 - 15.5 \cdot \log_2(f/1104)$;
 - for $1622 < f < 3750$, then $M = -46.5 - 2.9 \cdot \log_2(f/1622)$;
 - for $f = 3750$; then $M = -76.5$;
 - for $f = 3925$, then $M = -101.5$; and
 - for $f > 3925$, then $M = -101.5$.
15. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and U is the value of the mask in dBm/Hz:
- for $0 < f < 4$, then $U = -97.5$;
 - for $4 < f < 25.875$, then $U = -92.5 + 21.5 \cdot \log_2(f/4)$;
 - for $25.875 < f < 138$, then $U = -34.5$;

for $138 < f < 276$, then $U = -34.5 - 26 \cdot \log_2(f/138)$;
 for $276 < f < f_{int}$, then $U = -60.5 - 95 \cdot \log_2(f/276)$;
 for $f_{int} < f < 686$, then $U = 10 \log_{10}(0.05683 \cdot f^{1.5})$; and
 for $f > 686$, then $U = -100$.

16. The method of claim 9 wherein one of the number of masks is defined by the following relations, wherein f is a frequency band in kHz and D is the value of the mask in dBm/Hz:

for $0 < f < 4$, then $D = -97.5$;
 for $4 < f < 25.875$, then $D = -92.5 + 21 \cdot \log_2(f/4)$;
 for $25.875 < f < 1104$, then $D = -38.3$;
 for $1104 < f < 1622$, then $D = -38.3 - 14.75 \cdot \log_2(f/1104)$;
 for $1622 < f < 3750$, then $D = -46.5 - 2.9 \cdot \log_2(f/1622)$;
 for $f = 3750$, then $D = -76.5$; and
 for $f > 3925$, then $D = -101.5$.